Health Consultation

SANDFILL LANDFILL NO. 2 PROPERTY
(a/k/a SANDFILL LANDFILL NO. 2)

AVON, OAKLAND COUNTY, MICHIGAN

EPA FACILITY ID: MID980499875

JUNE 28, 2001

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Prepared by:

Michigan Department of Community Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Table of Contents

List of Figures

List of Tables

Abbreviations and Acronyms

ACV	Agency for Toxic Substances and Disease Registry Comparison Value
ATSDR	Agency for Toxic Substances and Disease Registry
BFRA	Brownfields Redevelopment Assessment
CREG	ATSDR Cancer Risk Evaluation Guide
DCC	MDEQ Generic Soil Direct Contact Criterion or Criteria
DWC	MDEQ Generic Drinking Water Criterion or Criteria
DWPC	MDEQ Generic Soil Drinking Water Protection Criterion or Criteria
DWRP	MDEQ Division of Drinking Water and Radiological Protection
EMEG	ATSDR Environmental Media Evaluation Guide
GCC	MDEQ Generic Groundwater Contact Criterion or Criteria for direct dermal contact with water
GSI	Groundwater-Surface Water Interface
GSIPC	MDEQ Generic Soil GSI Protection Criterion or Criteria
IA	Integrated Assessment
LTHA	U.S. EPA Drinking Water Health Advisories (Lifetime)
MCL	U.S. EPA Safe Drinking Water Act Maximum Contaminant Level
MDCH	Michigan Department of Community Health
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MDPH	Michigan Department of Public Health
MRL	ATSDR Minimal Risk Level
NPL	U.S. EPA National Priorities List, also known as the Superfund List
ppb	parts per billion
ppm	parts per million
RfD	U.S. EPA Reference Dose
RI	Remedial Investigation
RMEG	Reference Dose Media Evaluation Guide
SMCL	U.S. EPA Safe Drinking Water Act Secondary Maximum Contaminant Level
UCL	95% Upper Confidence Limit of the Mean
U.S. EPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

Effective October 1, 1995, the environmental regulation and remediation functions of the Michigan Department of Natural Resources (MDNR) were transferred to the newly formed Michigan Department of Environmental Quality (MDEQ). On April 1, 1996, the Michigan Department of Public Health (MDPH) Division of Health Risk Assessment (DHRA) was transferred into the newly formed Michigan Department of Community Health (MDCH). The MDPH Division of Water Supply was transferred to the MDEQ Division of Drinking Water and Radiological Protection (DWRP). The site history and background section of this document uses the departmental identifiers in effect at the time of the events.

Foreword

The federal Agency for Toxic Substances and Disease Registry (ATSDR) and the Michigan Department of Community Health (MDCH) have a cooperative agreement for conducting assessments and consultations regarding potential health hazards at toxic chemical contamination sites within the State of Michigan. The Michigan Department of Environmental Quality (MDEQ), Superfund Section, has asked the MDCH to evaluate any health risks associated with several properties included in the Brownfield Pilot Projects in Detroit and other cities in Michigan.

The U.S. Environmental Protection Agency (U.S. EPA) defines Brownfield properties as "abandoned, idled, or under-used" industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination. Local governmental entities have asked the MDEQ to conduct environmental assessments of the Brownfield properties in their jurisdiction. The MDEQ has consulted with the MDCH concerning public health aspects of these assessments.

The MDCH health consultation for a Brownfield property includes consideration of the following fundamental questions:

- Are there any imminent or urgent threats to public health associated with the property?
- Does the proposed future use of the property pose any long-term public health hazard?
- What specific actions, if any, are necessary to make the property safe for future use?
- Is there enough information available to answer these questions, and if not, what additional information is needed?

Summary

The Sandfill Landfill #2 property is a former gravel pit in Oakland County, Michigan. The property was later used as a landfill, primarily for domestic wastes with some industrial wastes included. The landfill was closed in 1977. It has been proposed to build an automobile oil-change business on the property.

Under current conditions, the Sandfill Landfill #2 property does not pose any apparent public health hazard. Acetone, benzene, and lead were detected in shallow groundwater at the property at concentrations above safe drinking water standards; however, there is no indication that the water at any nearby residential well has been affected to date. The MDCH recommends that deed restrictions or institutional controls be implemented to prevent future exposures to contaminants present in soil and groundwater.

Background And Statement Of Issues

The Michigan Department of Environmental Quality (MDEQ) has asked the Michigan Department of Community Health (MDCH) to evaluate the health risks associated with the Sandfill Landfill #2 property as part of their Brownfield Redevelopment Assessment of the property.

The Sandfill Landfill #2 property is located at 1843 Hamlin Road, in the northwest corner of the intersection of Hamlin and Dequindre Roads, in Rochester Hills, Oakland County, Michigan (Figure 1 and Figure 2). The property was mined for sand and gravel before 1968. From 1968 to 1977, the former gravel pit was used primarily as a landfill for the disposal of domestic wastes, with some industrial wastes from unidentified sources included. The landfill was closed and covered in 1977. A buyer for the property intends to use it for a commercial automobile oil-change business (Krajcovic 2001, MDEQ 1999b).

As shown in Figure 2, the Ladd Drain, an open ditch, runs from west to east across the northern end of the property, eventually discharging to the Clinton River, which is approximately 1 mile to the northeast.

The Sandfill Landfill #2 is one of approximately a dozen similar operating or closed landfills in former gravel pits within the 4-square-mile area centered at the corner of Hamlin and Dequindre Roads in Oakland and Macomb [1] Counties (see figure 3). The MDEQ, U.S. EPA, ATSDR, and MDCH have investigated many of these landfills under Superfund or Brownfield programs because of reports or suspicions of environmental contamination. Adjacent to the property on the west are the J&L Landfill, which is on the U.S. EPA's National Priorities List (NPL) also called the Superfund List, and the Sandfill Landfill #1. There are other closed landfills across

1. Dequindre Road, the east boundary of the property marks the boundary between Oakland County (to the west) and Macomb County (to the east).

Dequindre Road to the east of the north end of the property. Relevant information brought out by the Remedial Investigation of the J&L Landfill in 1990 and 1991 will be cited in this consultation (ATSDR 1989, E&E 1988, 1991, MDCH 1996, 1997a, 2000a-b, MDEQ 1999a-b, MDPH 1992a-b, 1993, Weston 1991).

From December 1996 through February 1997, the MDCH surveyed residences and businesses east of J&L Landfill and Sandfill Landfill #2 to locate private wells in use (MDCH 1997b). In September and October 1997, following up on this survey, the MDEQ Drinking Water and Radiological Protection Division (DWRP) and the Macomb and Oakland County health departments collected water samples from 10 wells east (down gradient) from the Sandfill Landfill #2 (MDEQ 1998).

The MDEQ conducted fieldwork for a Brownfield Redevelopment Assessment (BFRA) of the Sandfill Landfill #2 property in October 1999 (MDEQ 1999b, 2000b). MDCH personnel visited the property on October 26, 1999.

Discussion

The sampling results discussed in this consultation were taken from the available investigations of the property, and are not adjusted for limitations or biases in the sampling programs. The tables presented in this consultation include maximum and 95% Upper Confidence Limits for the Mean concentrations in the samples collected. Health discussions are based on the maximum concentrations reported and long-term, frequent exposure scenarios, which are reasonably conservative assumptions.

Chemicals of concern for this consultation were selected from those that were found in some environmental medium at the property at a concentration above either MDEQ Generic Clean-up Criteria (MDEQ 2000a) or ATSDR Comparison Values (ACVs). ACVs used in this consultation include (ATSDR 2000f):

- ATSDR Environmental Media Evaluation Guides (EMEGs): Concentrations computed from the ATSDR Minimal Risk Level (MRL) for chronic exposure of a child, assuming pica behavior (a rare and abnormal consumption of non-food materials, such as soil, most often seen in children under 5 years of age) for soil ingestion;

- ATSDR Cancer Risk Evaluation Guides (CREGs): Concentrations that would give an estimated increased cancer risk of 1 in 1 million from a lifetime of incidental ingestion of soil or daily consumption of water;

- Reference Dose Media Evaluation Guides (RMEGs): Concentrations computed from the U.S. EPA Reference Dose (RfD) for chronic exposure of a child, assuming pica behavior for soil ingestion;

- U.S. EPA Drinking Water Health Advisories (Lifetime) (U.S. EPA 1996); and,

- U.S. EPA Safe Drinking Water Act Maximum Contaminant Levels (U.S. EPA 1996).

If no ACVs for a chemical in a medium exist, or there is no CREG available for a possible, probable, or proven carcinogen, the chemical is retained as a contaminant of concern (ATSDR 1992a).

Environmental Contamination and Other Hazards

On-site Contamination

During the J&L Remedial Investigation (RI) in August 1990, the contractors collected four surface soil samples from the east (Sandfill Landfill #2) side of the ditch separating the two properties, and one surface soil sample from Sandfill property north of the J&L Landfill. In January 1991, they collected 6 additional samples of surface soil from the Sandfill Landfill #2 property. No sample in either sampling event contained any chemical of concern at concentrations above the MDEQ soil direct contact criteria (DCC) for industrial or commercial land use (Table 1). The DCC are soil concentrations that are protective of dermal contact with and incidental ingestion of soil under an industrial or commercial land use scenario. At least one sample from both 1990 and 1991 contained aluminum, chromium, cobalt, iron, magnesium, manganese, nickel, or vanadium (1990 only) at concentrations above the MDEQ drinking water protection criteria (DWPC). At least one sample from each year contained chromium, cobalt, 1,4-dichlorobenzene (1990 only), and zinc (1991 only) at concentrations above the groundwater-surface water protection criteria (GSIPC) (MDEQ 2000a, Weston 1991). The groundwater protection criteria are soil concentrations that are not expected to leach and contaminate groundwater at levels greater than the either the drinking water criteria (DWC) or the groundwater-surface water interface (GSI) criteria. At least one sample contained arsenic, chromium, manganese, nickel, vanadium, zinc, or various other chemicals at concentrations above ACVs (ATSDR 2000f).

In January 1991, the J&L RI contractors drilled four borings into the Sandfill Landfill and collected a total of five samples of subsurface material, including a duplicate sample. Three of the four borings had household waste, and the fourth; collected in the northern end of the property but south of Ladd Drain, had industrial slag. The duplicate sample was collected from the boring that had slag. Table 2 shows that the slag contained much higher concentrations of some metals than did the waste. Organic chemical concentrations were comparable, with the waste containing slightly more than the slag. The slag samples contained lead concentrations above the DCC for industrial and commercial land use. Samples of both waste and slag contained aluminum, antimony, chromium, cobalt, iron, magnesium, and manganese concentrations above the DWPC. The slag samples also contained concentrations of cadmium, lead, nickel, selenium, silver, and zinc above the DWPC. At least one sample of the waste also contained ethylbenzene, mercury, methylene chloride, or xylenes at concentrations above the DWPC. Samples of both waste and slag contained chromium and cobalt at concentrations above the GSIPC. The slag samples also contained lead, naphthalene, phenanthrene, and zinc

concentrations above the GSIPC. At least one sample of the waste contained ethylbenzene, 4-methylphenol, toluene, and xylene concentrations above the GSIPC (MDEQ 2000a, Weston 1991). At least one sample from the slag or the waste contained concentrations of aluminum, antimony, arsenic, cadmium, chromium, manganese, nickel, selenium, silver, zinc, or other chemicals above ACVs (ATSDR 2000f).

The J&L RI contractors collected surface water samples twice, on July 29, 1990, during a dry period in the summer, and on October 19, 1990, during a wetter autumn. During the dry period sampling, the RI contractors collected a surface-water sample from the Ladd Drain where the ditch separating the J&L Landfill and Sandfill Landfill #2 enters it. This sample did not contain any chemical at concentrations above the Michigan Ambient Water Quality Standards (Table 3) (MDEQ 2000a, Weston 1991).

On October 19, 1990, the contractors collected another surface-water sample from the place they had sampled in July and additional samples from the Ladd Drain approximately 150 feet downstream (northeast) and 300 feet upstream (southwest). The upstream location is a few feet inside the northwest corner of the J&L Landfill property. As summarized in Table 3, at least one of the three samples contained chromium, lead, or vanadium at concentrations above the Michigan Ambient Water Quality Standards. The concentrations of chemicals of concern in the samples tended to increase from upstream to down. The sample collected downstream contained the highest concentration of all three metals cited above, and the sample collected on the property contained a chromium concentration above the Michigan Ambient Water Quality Standard. Comparing the concentrations in the two samples collected in the same location found no consistent pattern of change (Weston 1991).

In September and October 1990, the RI contractor collected sediment samples from the same places on or near Sandfill Landfill #2 property where they collected surface-water samples. None of these samples contained any chemical of concern above the DCC for industrial and commercial land use (Table 4) (MDEQ 2000a). The middle sample contained the lowest cyanide concentration (42.7 ppm) of the three (Weston 1991). At least one sample contained arsenic, cyanide, or various other chemicals at concentrations above ACVs (ATSDR 2000f).

During the BFRA in October 1999, the MDEQ collected 15 samples of surface soil from the property. No sample contained any chemical at concentrations above the DCC for industrial and commercial land use (Table 1). All these samples contained aluminum, chromium, cobalt, iron, magnesium, manganese, or nickel at concentrations above the respective DWPC. All samples also contained chromium and cobalt, and some samples contained chlorobenzene, cyanide, and zinc at concentrations above the respective GSIPC (MDEQ 2000a-b). At least one sample contained aluminum, chromium, manganese, nickel, or various other chemicals at concentrations above ACVs (ATSDR 2000f).

The MDEQ also constructed and collected water samples from nine temporary monitoring wells on the property (TMW01-04 and TMW07-11 in Figure 2). All the samples contained aluminum, iron, and manganese concentrations above the MDEQ DWC and the U.S. EPA Secondary

Maximum Contaminant Limit (SMCL) (Table 5). At least one sample contained antimony, arsenic, alpha-, beta-, gamma-, or delta-BHC, benzene, barium, cadmium, ethylbenzene, lead, sodium, vanadium, or xylenes at concentrations above DWC or U.S. EPA Drinking Water Standards (MDEQ 2000a, U.S. EPA 1996). At least one sample contained concentrations of the above-listed chemicals or various other chemicals above ACVs (ATSDR 2000f). One well (TMW02 in Figure 2) in the northwest corner of the property, north of the Ladd Drain, contained the maximum concentrations of barium, lead, other metals, benzene, xylenes, and other volatile organic chemicals, semi-volatile organic chemicals, and PCBs. A well in the southeast corner of the property (TMW11) contained the maximum concentrations of the BHC isomers, by a factor of 100 above the trace concentrations found in water from any other well. Water from TMW02 (up gradient) tended to contain higher concentrations of contaminants than did TMW03 or TMW04 (down gradient). Water from TMW03 contained the highest concentration of arsenic found, with that from TMW01 second highest (24 ppb). TMW08 (down gradient) did contain higher concentrations of the contaminants than did TMW07 (up gradient) (MDEQ 2000b).

The MDEQ also collected samples of surface water from seven locations along the Ladd Drain where it crosses the north end of the property. At least one of the samples contained gamma-BHC, cadmium, chromium, cobalt, lead, mercury, or vanadium at concentrations above the Michigan Ambient Water Quality Standards (Table 3) (MDEQ 2000a-b). The highest concentrations of metals in the surface water samples were in one sample, the highest concentrations of BHC isomers were in another, and the highest concentrations of other organic chemicals were in yet another (MDEQ 2000b).

The MDEQ also collected samples of sediment from six locations (where they also collected surface water) along the Ladd Drain where it crosses the north end of the property (MDEQ 2000a-b). At least one sample contained concentrations of arsenic or various other chemicals above ACVs (ATSDR 2000f).

Off-Site Contamination

In 1990, during the Remedial Investigation of the J&L Landfill (adjacent to the Sandfill Landfill #2 property), water samples were collected from eight residential wells, four upgradient (west) and four down gradient (east) from both properties. Most of the wells, upgradient or down gradient, contained iron and manganese concentrations above the MDEQ DWC and the SMCL (Table 6). One well on School Road north of Sandfill Landfill #1 (northwest of Sandfill Landfill #2) contained a lead concentration above the DWC but not above the U.S. EPA Proposed Action Level or the ACV (ATSDR 2000f, MDEQ 2000b, U.S. EPA 1996, Weston 1991). Another well near School Road north of Sandfill Landfill #1 (northwest of Sandfill Landfill #2) and one well east of Dequindre Road near the intersection with School Road contained other chemicals at concentrations above ACVs (ATSDR 2000f, Weston 1991).

In September and October 1997, following up on the MDCH private well survey of the J&L Landfill area (MDCH 1997b), the MDEQ DWRP and the local health department collected water samples from ten wells east (down gradient) from the Sandfill Landfill #2. Water from several of

the wells contained sodium concentrations above the MDEQ DWC (Table 6). Water from many of the wells contained iron or manganese concentrations above the DWC and the SMCLs (MDEQ 1998, 2000a, U.S. EPA 1996). Water from at least one well contained concentrations of manganese or various other chemicals above ACVs (ATSDR 2000f). The highest concentrations of arsenic, iron, manganese, vinyl chloride (the only detection) and zinc were in water from a well serving the business currently operating on the closed Hamlin Road Landfill East. This well has had a history of high metal content, although no organic chemicals had been found in it before. The well is currently used only for lawn watering and equipment washing and not for drinking (E&E 1981, MDCH 2000a, MDEQ 1998).

In January 1991, the RI contractors collected two sediment samples from the Ladd Drain downstream of Dequindre Road and of the Sandfill Landfill #2. The results of the analysis are summarized in Table 4. None of the contaminants of concern was present at concentrations above the DCC for industrial and commercial land use. Both samples contained aluminum, cobalt, iron, magnesium, and manganese at concentrations above the DWPC, and the furthest downstream sample also contained a concentration of chromium above the DWPC. Both samples contained concentrations of chromium and cobalt above the GSIPC (MDEQ 2000a, Weston 1991). At least one sample contained chromium, manganese, and various other chemicals at concentrations that exceeded ACVs (ATSDR 2000f).

Physical and Other Hazards

Except for the Ladd Drain crossing the north end of the property, the property is essentially flat, with few trees. There was discarded furniture and industrial equipment on the property at the time of the MDCH visit.

Human Exposure Pathways

Source	Environmental Transport and Media	Chemicals of Concern	Exposure Point	Exposure Route	Exposed Population	Time Frame	Status
Landfill Waste	Waste to Surface Soil	see Table 1.	On-Site	Incidental Ingestion Dermal Contact Inhalation	Trespassers	Past	Complete
						Present	Complete
						Future	Complete
Landfill Waste	Waste to Surface Soil to Surface Water	see Table 3.	Ladd Drain	Incidental Ingestion Dermal Contact Inhalation	Waders	Past	Complete
						Present	Complete
						Future	Complete
Landfill Waste	Waste to Surface Soil to Surface Water to Sediments	see Table 1	Ladd Drain	Incidental Ingestion Dermal Contact	Waders	Past	Complete
						Present	Complete
						Future	Complete
Landfill Waste	Waste to Surface Soil	see Table 1	On-Site	Incidental Ingestion Dermal Contact Inhalation	Workers	Past	Complete
						Present	Potential
						Future	Complete
Landfill Waste	Waste (Direct Contact)	see Table 2	On-Site	Incidental Ingestion Dermal Contact Inhalation	Workers	Past	Complete
						Present	Potential
						Future	Complete
Landfill Waste	Waste to Groundwater to Private Well	See Table 1 and Table 6	Nearby Residential Wells	Ingestion Dermal Contact Inhalation	Off-site Residents	Past	Potential
						Present	Potential
						Future	Potential

The property is currently vacant, and the only people likely to be exposed to site contaminants in soil are trespassers (see table above). Access to the property is not restricted. There have been reports that older children and adults cross the property from the residences south of Hamlin Road to a recreation center located across Dequindre Road from the north end of the property. Signs of on-going trespass, such as litter, have been observed. Trespassers on the property could be exposed to site contaminants through dermal contact with and incidental ingestion of soil (Table 1). They might inhale particles of contaminated dust picked up by the wind or evaporated volatile chemicals. The most likely trespassers are older children and young adults.

Workers on the property when the landfill was in operation may have contacted the waste, slag, or contaminated surface soil.[2] Former landfill workers could have been exposed to site contaminants through dermal contact with and incidental ingestion of soil, and inhalation of contaminated dust picked up by the wind or evaporated volatile chemicals.

Future site workers might come into contact with contaminated surface soil. Any excavation necessary for the construction could expose construction workers to contaminated slag or waste.

As mentioned above, the Ladd Drain flows into the Clinton River approximately 2 miles northeast of the Kingston Development properties. The river flows to the southeast into Lake St. Clair, with two outlets approximately 16 and 20 miles east-southeast from the properties. There are no known public water intakes from the Clinton River below the property.

Groundwater flow in the area is almost due east, according to water level measurements in the RI for the J&L Landfill (Weston 1991). Detroit City water, from Lake Huron or the Detroit River, is available throughout the vicinity of the property. Some residents of the area have chosen not to connect to the municipal water system or to use private wells for irrigation or other non-consumption purposes while using municipal water for consumption, washing, and bathing (MDCH 1997b).

Toxicological Evaluation

As indicated in Table 1, contaminants in soil do not exceed the MDEQ DCC for industrial and commercial land use. Therefore, no one who is likely to be on the property under both the current use and the proposed future use (commercial) is expected to suffer adverse health effects from exposure to the soil or sediment on or adjacent to the property (ATSDR 1990a-b, 1992b-h,

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2. The subsurface soil in contact with the buried waste probably contains many of the same contaminants as the waste, and former or future workers might have or might come into contact with the subsurface soil. However, the only subsurface-soil samples collected from the property we know of consisted of slag and waste, and we have no data on other subsurface materials (Weston 1991).

1994, 1995a-b, 1996, 1997a-f, 1998b-c, 1999a-e, 2000a-e, Hingley 1997, HSDB 1999, IRIS 1998, U.S. EPA 1999, Weiss, et al 1993).

Several contaminants were detected in shallow groundwater at the properties (see Table 5) at concentrations above the MDEQ DWC. No one is known to be using the shallow groundwater at this time. Sampled private wells down gradient from the property have not contained any contamination that can be attributed to the property (Table 6).

ATSDR Child Health Initiative

Children can be particularly vulnerable to environmental toxicants. Some unique vulnerabilities of children to environmental toxicants in general are discussed below.

Before birth, children are forming the body organs that need to last a lifetime. This is the time when chemical injury may lead to serious adverse health effects. Injury during key periods of growth and development may lead to malformation of organs (teratogenesis), disruption of function, and premature death. Exposure of the mother leads to exposure of the fetus, via the placenta, or may affect the fetus because of injury or illness sustained by the mother (ATSDR 1998a).

After birth, children may have greater exposures to environmental toxicants than adults. Pound for pound of body weight, children drink more water, eat more food, and breathe more air than adults. For example, children in the first 6 months of life drink 7 times as much water per pound as the average adult living in the United States. Two characteristics of children further magnify their exposures to toxicants in the environment: (1) play activities close to the ground, which increase their exposure to toxicants in dust and soil plus toxicants in airborne particulate matter, and (2) typical hand-to-mouth behavior, which increases intakes of any toxicants. In addition, teenagers may accidentally wander or deliberately trespass onto or into restricted locations. The obvious implication for environmental health is that children can experience substantially greater doses than adults to toxicants that are present in soil, water, or air. This fact has been demonstrated very clearly for children's exposures to pesticides in the diet (ATSDR 1998a). A child who is exposed to lead, mercury, or PCBs before or after birth might experience deficiencies of development of the neurological system (ATSDR 1977e, 1999d-e). The concentrations of lead in the soil on the property are not considered to be of health concern (Table 1). Some of the groundwater and surface water at the property does contain concentrations of lead above the U.S. EPA proposed Action Level for lead in drinking water. However, water from nearby residential wells has not contained lead concentrations of health concern (Table 5 and Table 6).

Conclusions

Under both current and future conditions, the Sandfill Landfill #2 property does not pose any apparent public health hazard. The concentrations of contaminants in soil and sediments do not exceed levels of concern. The shallow groundwater at the property contains arsenic, benzene,

lead, and other chemicals at concentrations above drinking water standards. However, the shallow groundwater is not currently used as a source of potable water. Near-by residential drinking water wells have not shown any contamination that can be connected to the property.

Recommendations

- Implement institutional controls or deed restrictions to prevent use of the groundwater at the properties.
- Implement deed restrictions to prevent residential development of the properties without further assessment and/or remediation.
- Use appropriate precautions to minimize disruption of the cap on the landfill and exposure of the waste as a result of future development of the properties.
- Implement a health and safety plan to protect future construction and other workers from unacceptable exposures to wastes contained in the landfill.
- Prevent exposure of near-by residents to site contaminants during future construction. For example, dust control measures may be necessary to prevent soil contaminants from drifting off-site during construction.

New environmental data or information concerning the future use of this property may require future health consultations.

Public Health Action Plan

A draft of this document has been sent to the MDEQ for review. The Brownfield Redevelopment Assessment (BFRA) of the property has already been completed, however, the MDEQ could cite these conclusions from the draft document. The final edition of the consultation will also be sent to the MDEQ and the property owner for inclusion in the final BFRA. Any developers interested in acquiring the property will be given the BFRA to review before they begin work.

The MDCH will be available to consult on the appropriateness and efficacy of future remedial actions.

If any citizen has additional information or health concerns regarding the Sandfill Landfill #2 property, please contact the Michigan Department of Community Health, Division of Environmental and Occupational Epidemiology, at 1-800-648-6942

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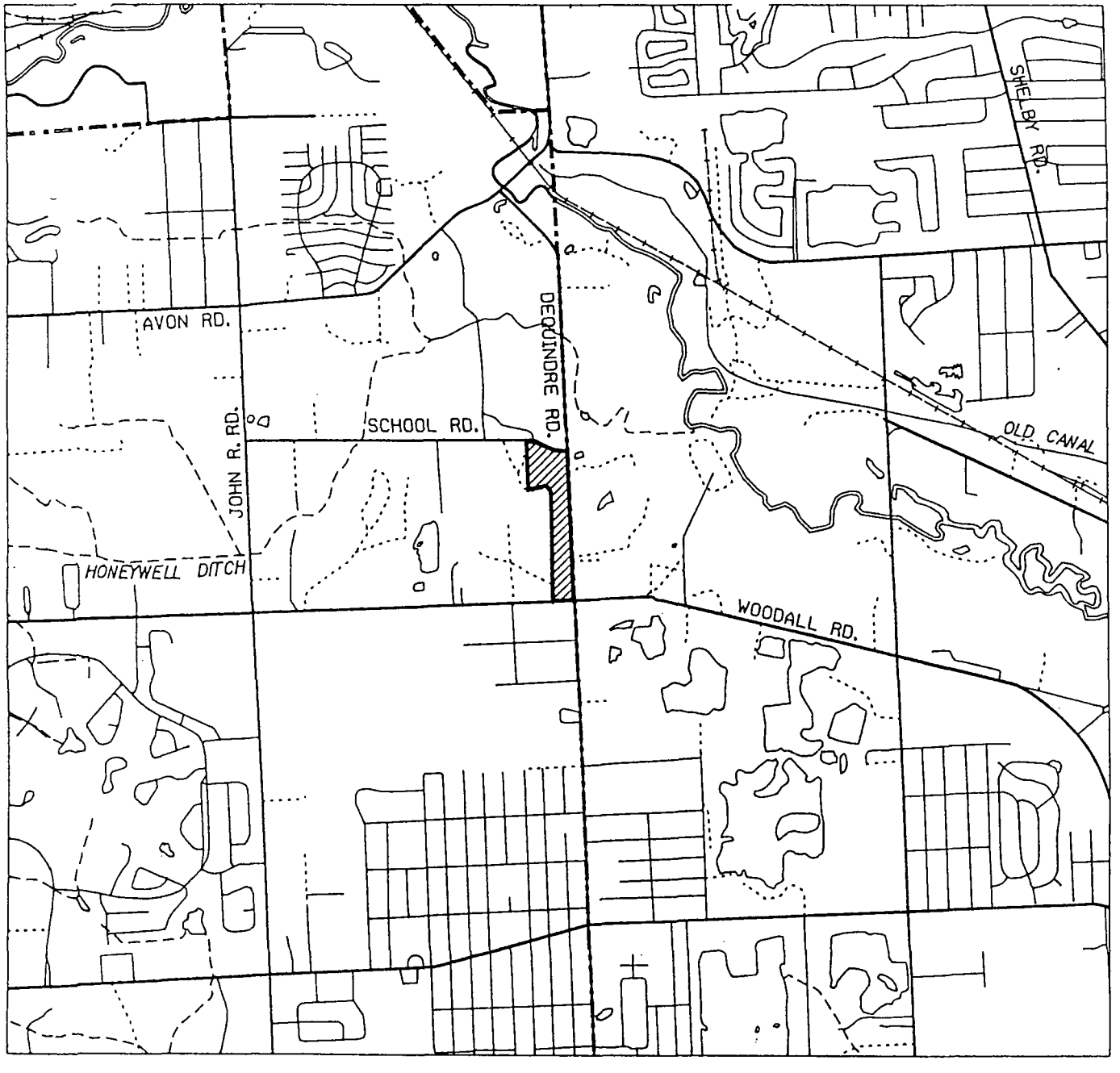
Figure 1.



SANDFILL LANDFILL #2

OAKLAND COUNTY, MICHIGAN

PROPERTY LOCATION

- INTERSTATE HIGHWAYS (496)
- U.S. HIGHWAYS (2)
- STATE HIGHWAYS (55)
- OTHER MAJOR ROADS
- MINOR ROADS
- TWO-TRACK ROADS
- AIRPORTS
- GRASS AIRSTRIPS
- RAILROADS
- ABANDONED RAILROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- POLITICAL BOUNDARIES
- PROPERTY

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MILES

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Michigan Department of Community Health

Base map information provided by Michigan Department of Natural Resources, MIRIS Program

02/23/01

SANDFILL LANDFILL #2

SITE FEATURES AND VICINITY

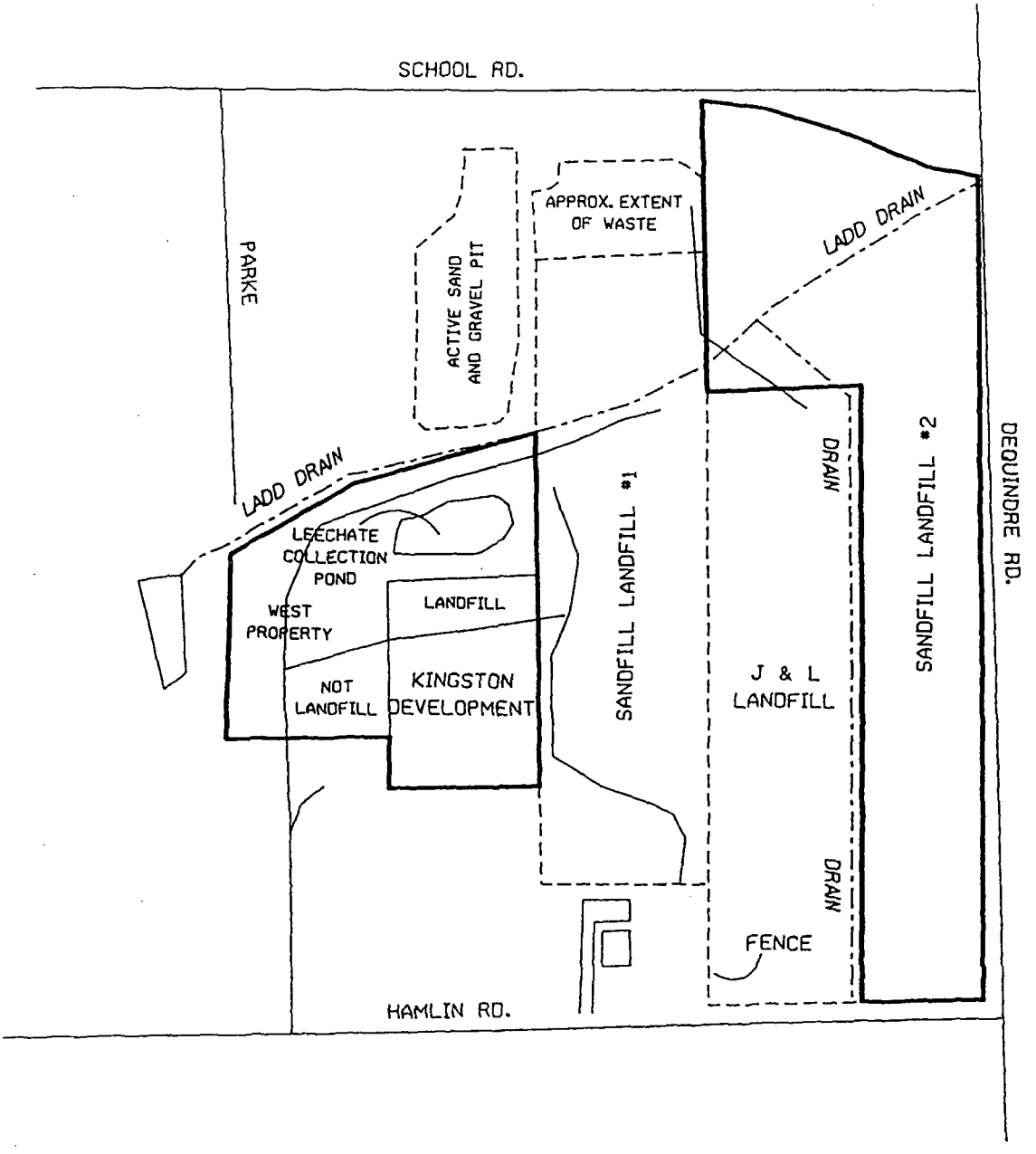
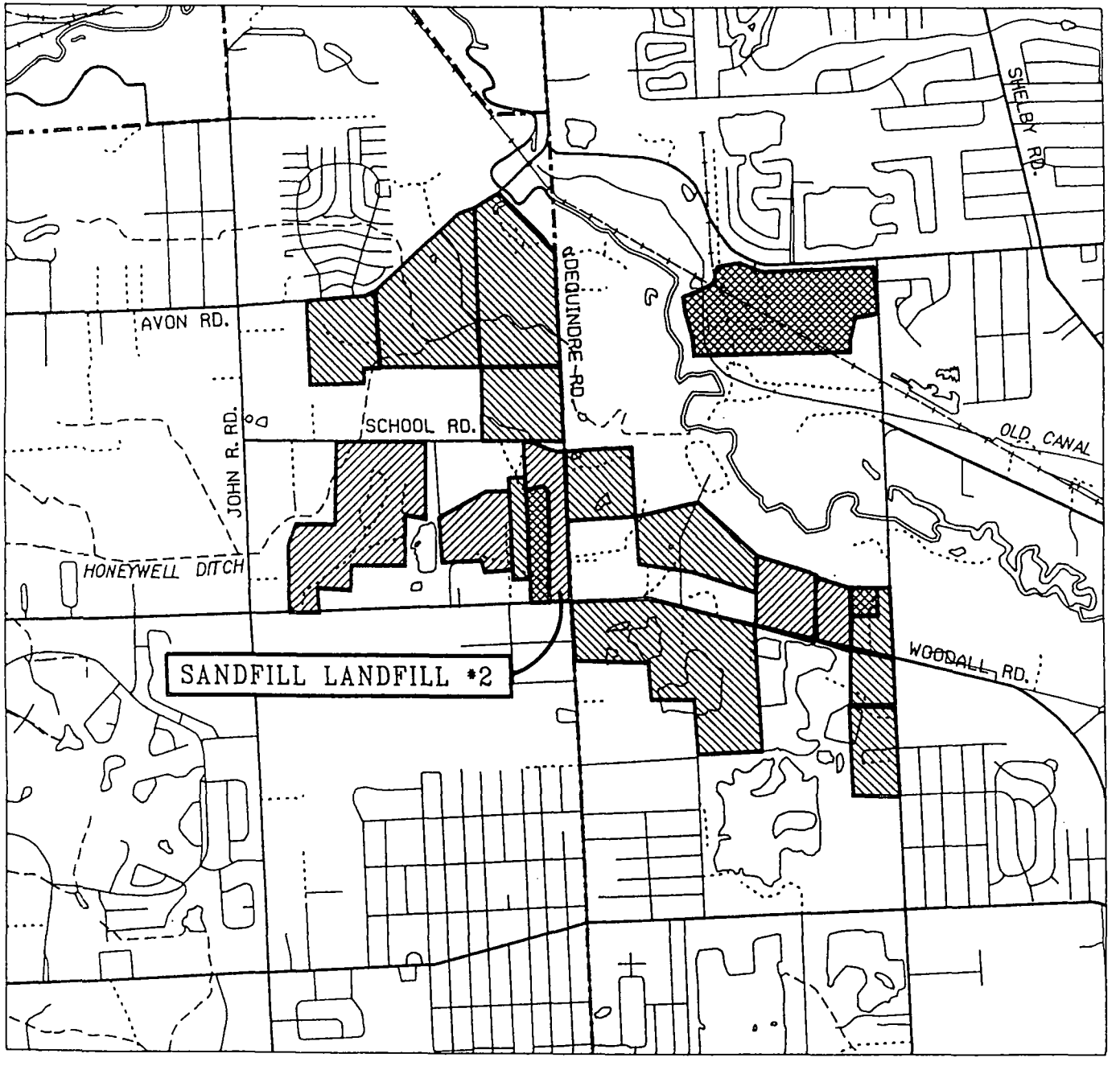


Figure 2.

Figure 3.



SANDFILL LANDFILL #2 AND SURROUNDING CLOSED LANDFILLS
OAKLAND COUNTY, MICHIGAN

PROPERTY LOCATION

- INTERSTATE HIGHWAYS (496)
- U.S. HIGHWAYS (2)
- STATE HIGHWAYS (55)
- OTHER MAJOR ROADS
- MINOR ROADS
- TWO-TRACK ROADS
- AIRPORTS
- GRASS AIRSTRIPS
- RAILROADS
- ABANDONED RAILROADS
- RIVERS AND STREAMS
- INTERMITTENT STREAMS
- POLITICAL BOUNDARIES
- BROWNFIELD PROPERTIES
- SUPERFUND SITES
- OTHER CLOSED LANDFILLS

N

MILES

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Michigan Department of Community Health

Base map information provided by Michigan Department of Natural Resources, MIRIS Program

02/23/01

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Certification

This Sandfill Landfill #2 Health Consultation was prepared by the Michigan Department of Community Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

Technical Project Officer, SPS, SSAB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.

for Chief, State Program Section, SSAB, DHAC, ATSDR

Tables

Table 1. Concentrations of chemicals of concern in surface soil samples collected from the Sandfill Landfill #2 property during the J&L Landfill Remedial Investigation (1990-1) and the Brownfield Redevelopment Assessment of the property. (1999).

Chemical	Date	Maximum Concentration (ppm)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppm)	No. of detections / No. of samples	No. of samples above DCC for Industrial and Commercial Land Use (MDEQ 2000a)	No. of samples above DWPC (MDEQ 2000a)	No. of samples above GSIPC (MDEQ 2000a)	Reference
acenaphthylene	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	0.063	0.0159	2 / 15	0	0	0	MDEQ 2000b
aldrin	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	0.0005	0.00034	3 / 6	0	0	0	Weston 1991
	10/27/99	0.0025	0.00122	6 / 15	0	0	0	MDEQ 2000b
aluminum	8/1/90	**15,800**	**11,000**[1]	5 / 5	0	5	0	Weston 1991
	1/26/91	**23,900**	**21,200**	6 / 6	0	6	0	Weston 1991
	10/27/99	**17,800**	**14,700**	15 / 15	0	15	0	MDEQ 2000b
antimony	8/1/90	**23.5**	**19.6**	3 / 5	0	0	0	Weston 1991
	1/26/91	**14.2**	**8.15**[1]	4 / 6	0	0	0	Weston 1991
	10/27/99	**14**	**5.74**	13 / 15	0	0	0	MDEQ 2000b
arsenic	8/1/90	**13.7**	**11.7**	5 / 5	0	0	0	Weston 1991
	1/26/91	**9.2**	**8.02**	6 / 6	0	0	0	Weston 1991
	10/27/99	**21.5**	**7.5**	9 / 15	0	0	0	MDEQ 2000b
barium	8/1/90	**240**	**204**	5 / 5	0	0	0	Weston 1991
	1/26/91	72.6	65.3	6 / 6	0	0	0	Weston 1991
	10/27/99	176	90.8	15 / 15	0	0	0	MDEQ 2000b
benzo(a)pyrene	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	0.071	0.041	1 / 6	0	0	0	Weston 1991
	10/27/99	**0.61**	**0.213**	14 / 15	0	0	0	MDEQ 2000b
benzo(b)fluoranthene	8/1/90	0.081	0.0612	1 / 5	0	0	0	Weston 1991
	1/26/91	0.22	0.163	3 / 6	0	0	0	Weston 1991
	10/27/99	**0.63**	0.237	14 / 15	0	0	0	MDEQ 2000b
benzo(g,h,i)perylene	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	0.82	0.251	15 / 15	0	0	0	MDEQ 2000b

1. Mean of samples. The calculated UCL is greater than the maximum value.

Table 1. (Cont.)

Chemical	Date	Maximum Concentration (ppm)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppm)	No. of detections / No. of samples	No. of samples above DCC for Industrial and Commercial Land Use (MDEQ 2000a)	No. of samples above DWPC (MDEQ 2000a)	No. of samples above GSIPC (MDEQ 2000a)	Reference
beryllium	8/1/90	**1.3**	**1.12**	5 / 5	0	0	0	Weston 1991
	1/26/91	**0.82**	**0.689**	6 / 6	0	0	0	Weston 1991
	10/27/99	**1.6**	**1.07**	15 / 15	0	0	0	MDEQ 2000b
alpha-BHC	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	0.0027	0.000566	1 / 15	0	0	0	MDEQ 2000b
delta-BHC	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	0.00069	0.000210	2 / 15	0	0	0	MDEQ 2000b
gamma-BHC (Lindane)	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	0.00056	0.000117	1 / 15	0	0	0	MDEQ 2000b
bis(2-ethylhexyl)phthalate	8/1/90	0.092	0.0695	1 / 5	0	0	0	Weston 1991
	1/26/91	0.075	0.0584	2 / 6	0	0	0	Weston 1991
	10/27/99	0.1	0.0538	10 / 15	0	0	0	MDEQ 2000b
cadmium	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	**0.48**	*0.276*	1 / 6	0	0	0	Weston 1991
	10/27/99	**2.2**	**1.01**	11 / 15	0	0	0	MDEQ 2000b
carbazole	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	0.14	0.0308	2 / 15	0	0	0	MDEQ 2000b
chlorobenzene	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	1.7	0.356	1 / 15	0	0	1	MDEQ 2000b
chromium	8/1/90	**3,640**	**2,800**	5 / 5	0	4	5	Weston 1991
	1/26/91	**2,470**	**2,240**	6 / 6	0	4	6	Weston 1991
	10/27/99	**4,270**	**2,070**	15 / 15	0	13	15	MDEQ 2000b
cobalt	8/1/90	20.9	20.1	5 / 5	0	5	5	Weston 1991
	1/26/91	20.3	20.3	6 / 6	0	6	6	Weston 1991
	10/27/99	23.1	17.8	15 / 15	0	15	15	MDEQ 2000b
copper	8/1/90	86.1	79.5	5 / 5	0	0	0	Weston 1991
	1/26/91	78.8	61.8	6 / 6	0	0	0	Weston 1991

Table 1. (Cont.)

Chemical	Date	Maximum Concentration (ppm)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppm)	No. of detections / No. of samples	No. of samples above DCC for Industrial and Commercial Land Use (MDEQ 2000a)	No. of samples above DWPC (MDEQ 2000a)	No. of samples above GSIPC (MDEQ 2000a)	Reference
	10/27/99	85.4	50	15 / 15	0	0	0	MDEQ 2000b
cyanide	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	0.68	0.360	13 / 15	0	0	3	MDEQ 2000b
dibenz(a,h)anthracene	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	**0.19**	0.0602	6 / 15	0	0	0	MDEQ 2000b
1,4-dichlorobenzene	8/1/90	1.2	0.930	3 / 5	0	0	1	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	ND	ND	0 / 15	0	0	0	MDEQ 2000b
iron	8/1/90	53,400	49,200	5 / 5	0	5	0	Weston 1991
	1/26/91	44,900	32,700	6 / 6	0	6	0	Weston 1991
	10/27/99	149,000	48,200	15 / 15	0	15	0	MDEQ 2000b
lead	8/1/90	*86.8*	*82.5*	5 / 5	0	0	0	Weston 1991
	1/26/91	*72.9*	*53.9*	6 / 6	0	0	0	Weston 1991
	10/27/99	*97.6*	*51.2*	15 / 15	0	0	0	MDEQ 2000b
magnesium	8/1/90	22,900	22,700	5 / 5	0	5	0	Weston 1991
	1/26/91	43,100	40,800	6 / 6	0	6	0	Weston 1991
	10/27/99	41,500	29,800	15 / 15	0	15	0	MDEQ 2000b
manganese	8/1/90	**8,710**	**7,060**	5 / 5	0	5	0	Weston 1991
	1/26/91	**12,900**	**11,210**	6 / 6	0	6	0	Weston 1991
	10/27/99	**8,350**	**4,450**	15 / 15	0	15	0	MDEQ 2000b
mercury	8/1/90	0.18	0.136	1 / 5	0	0	0	Weston 1991
	1/26/91	0.19	0.109	1 / 6	0	0	0	Weston 1991
	10/27/99	0.13	0.0896	11 / 15	0	0	0	MDEQ 2000b
methylene chloride	8/1/90	0.012	0.0105	2 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	ND	ND	0 / 15	0	0	0	MDEQ 2000b
2-methylnaphthalene	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	0.043	0.00902	1 / 15	0	0	0	MDEQ 2000b

Table 1. (Cont.)

Chemical	Date	Maximum Concentration (ppm)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppm)	No. of detections / No. of samples	No. of samples above DCC for Industrial and Commercial Land Use (MDEQ 2000a)	No. of samples above DWPC (MDEQ 2000a)	No. of samples above GSIPC (MDEQ 2000a)	Reference
2-methylphenol	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	*0.085*	*0.0488*	1 / 6	0	0	0	Weston 1991
	10/27/99	ND	ND	0 / 15	0	0	0	MDEQ 2000b
naphthalene	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	0.032	0.00671	1 / 15	0	0	0	MDEQ 2000b
nickel	8/1/90	**1,540**	**1,240**	5 / 5	0	3	0	Weston 1991
	1/26/91	**974**	**961**	6 / 6	0	4	0	Weston 1991
	10/27/99	**2,560**	**1,020**	15 / 15	0	10	0	MDEQ 2000b
PCBs (total)	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	0.014	0.00971	2 / 6	0	0	0	Weston 1991
	10/27/99	**0.167**	**0.0756**	8 / 15	0	0	0	MDEQ 2000b
phenanthrene	8/1/90	0.12	0.0906	1 / 5	0	0	0	Weston 1991
	1/26/91	0.13	0.0930	3 / 6	0	0	0	Weston 1991
	10/27/99	0.38	0.131	14 / 15	0	0	0	MDEQ 2000b
selenium	8/1/90	1.9	1.43	1 / 5	0	0	0	Weston 1991
	1/26/91	**98**	**57.9**	4 / 6	0	0	0	Weston 1991
	10/27/99	4.4	1.87	10 / 15	0	0	0	MDEQ 2000b
silver	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	2.1	1	14 / 15	0	0	0	MDEQ 2000b
sodium	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	343	323	6 / 6	0	0	0	Weston 1991
	10/27/99	483	285	14 / 15	0	0	0	MDEQ 2000b
thallium	8/1/90	ND	ND	0 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	0.83	0.522	1 / 15	0	0	0	MDEQ 2000b
toluene	8/1/90	1.8	1.09	4 / 5	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 6	0	0	0	Weston 1991
	10/27/99	ND	ND	0 / 15	0	0	0	MDEQ 2000b
vanadium	8/1/90	**83**	**70.9**	5 / 5	0	1	0	Weston 1991

Table 1. (Cont.)

Chemical	Date	Maximum Concentration (ppm)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppm)	No. of detections / No. of samples	No. of samples above DCC for Industrial and Commercial Land Use (MDEQ 2000a)	No. of samples above DWPC (MDEQ 2000a)	No. of samples above GSIPC (MDEQ 2000a)	Reference
	1/26/91	**62**	**56.2**	6 / 6	0	0	0	Weston 1991
	10/27/99	**70.8**	**47**	15 / 15	0	0	0	MDEQ 2000b
zinc	8/1/90	193	169	5 / 5	0	0	0	Weston 1991
	1/26/91	**808**	520	6 / 6	0	0	1	Weston 1991
	10/27/99	472	280	15 / 15	0	0	1	MDEQ 2000b

Bold concentrations exceed ACVs (ATSDR 2000f).

Shaded, double-lined chemicals have no ACVs in this medium (ATSDR 2000f).

Italicized concentrations did not exceed ACVs for non-cancer health effects but the chemicals are considered carcinogens and there are no CREGs available in this medium (ATSDR 2000f).

Chemicals which were never detected in this medium are not listed.

ND Not Detected

Table 2. Concentrations of chemicals of concern in subsurface slag or waste samples collected from the Sandfill Landfill #2 property during the Remedial Investigation of the J&L Landfill (1991).

Chemical	Maximum Concentration (ppm)		No. of samples above Groundwater Contact Criteria (MDEQ 2000a)	No. of samples above Drinking Water Criteria (MDEQ 2000a)	No. of samples above Groundwater Surface-Water Interface Criteria (MDEQ 2000a)
	Slag	Waste			
aldrin	0.0011	0.0013	0	0	0
aluminum	**12,000**	**8,960**	0	4	0
antimony	**133**	**4.2**	0	3	0
arsenic	**21**	**6**	0	0	0
barium	124	105	0	0	0
benzo(a)anthracene	**0.71**	**0.76**	0	0	0
benzo(a)pyrene	**0.43**	**0.33**	0	0	0
benzo(b)fluoranthene	**1.7**	**4.9**	0	0	0
benzo(g,h,i)perylene	0.16	0.18	0	0	0
beryllium	**0.27**	**0.39**	0	0	0
alpha-BHC	0.00015	0.001	0	0	0
beta-BHC	ND	0.00049	0	0	0
gamma-BHC (Lindane)	0.00063	0.0026	0	0	0
bis(2-ethylhexyl)phthalate	3	13	0	0	0
cadmium	**14.6**	ND	0	1	0
carbazole	0.32	0.2	0	0	0
chromium	**3,020**	**104**	0	3	4
cobalt	44.4	9.2	0	4	4
copper	317	86.4	0	0	0
dibenz(a,h)anthracene	ND	0.025	0	0	0
dibenzofuran	0.81	0.071	0	0	0
ethylbenzene	ND	20	0	2	3
iron	54,000	22,100	0	4	0
lead	*7,910*	*88.2*	1	1	1
magnesium	22,600	21,000	0	3	0
manganese	**12,500**	**732**	0	4	0
mercury	1.3	3.9	0	1	0
4-methyl-2-pentanone	ND	4.6	0	0	0
methylene chloride	1.4	ND	0	1	0
2-methylnaphthalene	1.5	0.044	0	0	0
4-methylphenol	ND	*1.4*	0	0	1
naphthalene	2.2	0.09	0	0	1
nickel	**2,420**	**58**	0	1	0
PCBs (total)	**1.9**	**0.2**	0	0	0
phenanthrene	2.4	1.3	0	0	1
selenium	**25.4**	ND	0	1	0
silver	**22.5**	0.52	0	1	0
sodium	370	308	0	0	0
thallium	0.75	ND	0	0	0
toluene	ND	5.8	0	0	1
vanadium	**57.7**	**19.3**	0	0	0

Talbe 2. (Cont.)

Chemical	Maximum Concentration (ppm)		No. of samples above Groundwater Contact Criteria (MDEQ 2000a)	No. of samples above Drinking Water Criteria (MDEQ 2000a)	No. of samples above Groundwater Surface-Water Interface Criteria (MDEQ 2000a)
	Slag	Waste			
xylenes (total)	0.18	73	0	2	3
zinc	**3,130**	374	0	1	1

Reference: Weston 1991

UCLs were not computed because the two data sets, slag and waste, contained too few samples (2 and 3, respectively) to compute reliable UCLs for each set.

Bold concentrations exceed ACVs (ATSDR 2000f).

Shaded, double-lined chemicals have no ACVs in this medium (ATSDR 2000f).

Italicized concentrations did not exceed ACVs for non-cancer health effects but the chemicals are considered carcinogens and there are no CREGs available in this medium (ATSDR 2000f).

Chemicals which were never detected in this medium are not listed.

ND Not Detected

Table 3. Concentrations of chemicals of concern found in surface water samples collected from the Ladd Drain on the Sandfill Landfill #2 property during the J&L Landfill Remedial Investigation (1990) and the Brownfield Redevelopment Assessment of the property (1999).

Chemical	Date	Maximum Concentration (ppb)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppb)	No. of detections / No. of samples	No. of samples above Michigan Ambient Water Quality Standards (MDEQ 2000a)	Reference
aluminum	7/29/90	1,740	1,740[1]	1 / 1	0	Weston 1991
	10/19/90	3,690	2,660[2]	3 / 3	0	Weston 1991
	10/27/99	**187,000**	**79,900**	7 / 7	0	MDEQ 2000b
arsenic	7/29/90	**12.7**	**12.7**[1]	1 / 1	0	Weston 1991
	10/19/90	**11.8**	**11.6**	1 / 3	0	Weston 1991
	10/27/99	**240**	**140**	6 / 7	2	MDEQ 2000b
barium	7/29/90	350	350[1]	1 / 1	0	Weston 1991
	10/19/90	312	310	3 / 3	0	Weston 1991
	10/27/99	**8,180**	**4,050**	7 / 7	2	MDEQ 2000b
benzene	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	**16**	**8.92**	5 / 7	0	MDEQ 2000b
beryllium	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	**1.3**	**1.28**	1 / 3	0	Weston 1991
	10/27/99	**9.8**	**4.18**	4 / 7	0	MDEQ 2000b
alpha-BHC	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	**0.19**	**0.0903**	4 / 7	0	MDEQ 2000b
beta-BHC	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	**0.029**	0.0123	1 / 7	0	MDEQ 2000b
delta-BHC	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	**0.27**	**0.143**	5 / 7	0	MDEQ 2000b
gamma-BHC (Lindane)	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	**0.41**	0.201	5 / 7	4	MDEQ 2000b
cadmium	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	**24.2**	**10.2**	1 / 7	1	MDEQ 2000b
chloroethane	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	1	0.423	1 / 7	0	MDEQ 2000b
chromium	7/29/90	*6.2*	*6.2*[1]	1 / 1	0	Weston 1991

1. One sample. Mean, UCL, and maximum all equal.

2. Average value among samples. The UCL is greater than maximum measured value.

Table 3. (Cont.)

Chemical	Date	Maximum Concentration (ppb)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppb)	No. of detections / No. of samples	No. of samples above Michigan Ambient Water Quality Standards (MDEQ 2000a)	Reference
	10/19/90	**31.1**	*20*[2]	3 / 3	2	Weston 1991
	10/27/99	**1,990**	**846**	7 / 7	3	MDEQ 2000b
cobalt	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	241	104	6 / 7	1	MDEQ 2000b
copper	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	7.8	*5*[2]	2 / 3	0	Weston 1991
	10/27/99	1,110	473	5 / 7	0	MDEQ 2000b
cyanide	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	11.7	6.95	6 / 7	0	MDEQ 2000b
cyclohexane	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	3	1.27	1 / 7	0	MDEQ 2000b
ethylbenzene	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	5	4.93	1 / 3	0	Weston 1991
	10/27/99	3	1.64	2 / 7	0	MDEQ 2000b
iron	7/29/90	4,570	4,570[1]	1 / 1	0	Weston 1991
	10/19/90	80,300	79,300	3 / 3	0	Weston 1991
	10/27/99	558,000	247,000	7 / 7	0	MDEQ 2000b
isopropylbenzene	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	2	1.01	2 / 7	0	MDEQ 2000b
lead	7/29/90	*9*	*9*[1]	1 / 1	0	Weston 1991
	10/19/90	**17.8**	**17.6**	1 / 3	1	Weston 1991
	10/27/99	**1,820**	**772**	5 / 7	1	MDEQ 2000b
magnesium	7/29/90	130,000	130,000[1]	1 / 1	0	Weston 1991
	10/19/90	40,500	32,600[2]	3 / 3	0	Weston 1991
	10/27/99	581,000	296,000	7 / 7	0	MDEQ 2000b
manganese	7/29/90	**241**	**241**[1]	1 / 1	0	Weston 1991
	10/19/90	**290**	**287**	3 / 3	0	Weston 1991
	10/27/99	**27,400**	**11,700**	7 / 7	0	MDEQ 2000b
mercury	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	1.1	0.527	7 / 7	7	MDEQ 2000b
methylcyclohexane	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	5	2.11	1 / 7	0	MDEQ 2000b
2-methylphenol	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	*0.6*	*0.254*	1 / 7	0	MDEQ 2000b

Table 3. (Cont.)

Chemical	Date	Maximum Concentration (ppb)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppb)	No. of detections / No. of samples	No. of samples above Michigan Ambient Water Quality Standards (MDEQ 2000a)	Reference
4-methylphenol	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	*0.9*	*0.521*	2 / 7	0	MDEQ 2000b
naphthalene	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	ND	ND	0 / 3	0	Weston 1991
	10/27/99	2	1.13	3 / 7	0	MDEQ 2000b
nickel	7/29/90	*37.7*	*37.7*[1]	1 / 1	0	Weston 1991
	10/19/90	*34.4*	*33.9*	1 / 3	0	Weston 1991
	10/27/99	**5,530**	**2,350**	7 / 7	0	MDEQ 2000b
selenium	7/29/90	3.2	3.2[1]	1 / 1	0	Weston 1991
	10/19/90	3.2	3.16	1 / 3	0	Weston 1991
	10/27/99	ND	ND	0 / 7	0	MDEQ 2000b
sodium	7/29/90	38,200	38,200[1]	1 / 1	0	Weston 1991
	10/19/90	70,400	69,899	3 / 3	0	Weston 1991
	10/27/99	428,000	367,000	7 / 7	0	MDEQ 2000b
toluene	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	6	5.92	1 / 3	0	Weston 1991
	10/27/99	ND	ND	0 / 7	0	MDEQ 2000b
vanadium	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	12.1	8.73[2]	3 / 3	1	Weston 1991
	10/27/99	**507**	**218**	6 / 7	1	MDEQ 2000b
xylenes (total)	7/29/90	ND	ND	0 / 1	0	Weston 1991
	10/19/90	14	13.8	1 / 3	0	Weston 1991
	10/27/99	13	7.13	3 / 7	0	MDEQ 2000b
zinc	7/29/90	26.8	26.8[1]	1 / 1	0	Weston 1991
	10/19/90	84.6	44.4[2]	3 / 3	0	Weston 1991
	10/27/99	**3,490**	1,500	7 / 7	0	MDEQ 2000b

Bold concentrations exceed ACVs (ATSDR 2000f).

Shaded, double-lined chemicals have no ACVs in this medium (ATSDR 2000f).

Italicized concentrations did not exceed ACVs for non-cancer health effects but the chemicals are considered carcinogens and there are no CREGs available in this medium (ATSDR 2000f).

Chemicals which were never detected in this medium are not listed.

ND Not Detected

Table 4. Concentrations of chemicals of concern in sediment samples collected from the Ladd Drain on or downstream from the Sandfill Landfill #2 property during the Remedial Investigation of the J&L Landfill (1990-1) and the Brownfield Redevelopment Assessment of the property (1999).

Chemical	Date	Maximum Concentration (ppm)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppm)	No. of detections / No. of samples	No. of samples above DCC for Indsutrial and Commercial Land Use (MDEQ 2000a)	No. of samples above DWPC (MDEQ 2000a)	No. of samples above GSIPC (MDEQ 2000a)	Reference
aldrin	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.0026	0.0022	2 / 5	0	0	0	MDEQ 2000b
aluminum	9/14/90	**9,810**	**9,450**	6 / 6	0	6	0	Weston 1991
	1/26/91	3,470	2,850[1]	2 / 2	0	2	0	Weston 1991
	10/27/99	**12,200**	**9,730**	6 / 6	0	6	0	MDEQ 2000b
antimony	9/14/90	ND	ND	0 / 6	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.71	0.504	2 / 6	0	0	0	MDEQ 2000b
arsenic	9/14/90	**27.3**	**19.2**	6 / 6	0	1	0	Weston 1991
	1/26/91	**5**	**4.9**[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	**13**	**11.1**	6 / 6	0	0	0	MDEQ 2000b
barium	9/14/90	81.5	76.2	6 / 6	0	0	0	Weston 1991
	1/26/91	26.8	23.9[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	118	96.1	6 / 6	0	0	0	MDEQ 2000b
benzene	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.093	0.0551	1 / 5	0	0	0	MDEQ 2000b
benzo(a)anthracene	9/14/90	0.12	0.110	2 / 4	0	0	0	Weston 1991
	1/26/91	0.42	0.42[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	0.24	0.168	4 / 5	0	0	0	MDEQ 2000b

1. Actual Mean, there are too few samples to reliably calculate the UCL.

Table 4. (Cont.)

Chemical	Date	Maximum Concentration (ppm)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppm)	No. of detections / No. of samples	No. of samples above DCC for Indsutrial and Commercial Land Use (MDEQ 2000a)	No. of samples above DWPC (MDEQ 2000a)	No. of samples above GSIPC (MDEQ 2000a)	Reference
benzo(a)pyrene	9/14/90	**0.14**	**0.104**	1 / 4	0	0	0	Weston 1991
	1/26/91	**0.26**	**0.255**[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	**0.24**	**0.17**	4 / 5	0	0	0	MDEQ 2000b
benzo(b)fluoranthene	9/14/90	0.24	0.137[2]	3 / 4	0	0	0	Weston 1991
	1/26/91	0.86	0.835[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	0.22	0.163	4 / 5	0	0	0	MDEQ 2000b
benzo(g,h,i)perylene	9/14/90	0.084	0.0622	1 / 4	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 2	0	0	0	Weston 1991
	10/27/99	0.21	0.155	4 / 5	0	0	0	MDEQ 2000b
beryllium	9/14/90	**0.6**	**0.430**	2 / 6	0	0	0	Weston 1991
	1/26/91	**0.24**	0.12[1]	1 / 2	0	0	0	Weston 1991
	10/27/99	**0.67**	**0.572**	6 / 6	0	0	0	MDEQ 2000b
alpha-BHC	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	0.00091	0.000455[1]	1 / 2	0	0	0	Weston 1991
	10/27/99	ND	ND	0 / 5	ND	ND	ND	MDEQ 2000b
beta-BHC	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	0.00071	0.000355[1]	1 / 2	0	0	0	Weston 1991
	10/27/99	ND	ND	0 / 5	ND	ND	ND	MDEQ 2000b
gamma-BHC (Lindane)	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	**0.022**	0.0139	3 / 5	0	1	1	MDEQ 2000b
delta-BHC	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.0021	0.00124	1 / 5	0	0	0	MDEQ 2000b
bis(2-ethylhexyl) phthalate	9/14/90	0.25	0.185	1 / 4	0	0	0	Weston 1991

2. Actual Mean. Computed UCL above Maximum Value

Table 4. (Cont.)

Chemical	Date	Maximum Concentration (ppm)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppm)	No. of detections / No. of samples	No. of samples above DCC for Indsutrial and Commercial Land Use (MDEQ 2000a)	No. of samples above DWPC (MDEQ 2000a)	No. of samples above GSIPC (MDEQ 2000a)	Reference
	1/26/91	0.045	0.0225[1]	1 / 2	0	0	0	Weston 1991
	10/27/99	0.56	0.354	4 / 5	0	0	0	MDEQ 2000b
cadmium	9/14/90	**1.8**	**1.58**	4 / 6	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	*0.32*	*0.241*	3 / 6	0	0	0	MDEQ 2000b
carbazole	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.038	0.0297	2 / 5	0	0	0	MDEQ 2000b
chromium	9/14/90	**658**	**355**	6 / 6	0	4	6	Weston 1991
	1/26/91	**57.5**	**33.2**[1]	2 / 2	0	1	2	Weston 1991
	10/27/99	**97.1**	**80.2**	6 / 6	0	5	6	MDEQ 2000b
chrysene	9/14/90	0.16	0.0988[2]	3 / 4	0	0	0	Weston 1991
	1/26/91	0.37	0.365[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	0.26	0.191	4 / 5	0	0	0	MDEQ 2000b
cobalt	9/14/90	14.6	11.7	5 / 6	0	5	5	Weston 1991
	1/26/91	3.6	3.1[1]	2 / 2	0	2	2	Weston 1991
	10/27/99	10.5	8.56	6 / 6	0	6	6	MDEQ 2000b
copper	9/14/90	29.4	25.4	6 / 6	0	0	0	Weston 1991
	1/26/91	7	5.6[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	32.3	28.8	6 / 6	0	0	0	MDEQ 2000b
cyanide	9/14/90	**200**	117	3 / 6	0	3	3	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.39	0.218	3 / 6	0	0	0	MDEQ 2000b
dibenz(a,h)anthracene	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.057	0.0396	2 / 5	0	0	0	MDEQ 2000b
iron	9/14/90	23,500	22,200	6 / 6	0	6	0	Weston 1991

Table 4. (Cont.)

Chemical	Date	Maximum Concentration (ppm)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppm)	No. of detections / No. of samples	No. of samples above DCC for Indsutrial and Commercial Land Use (MDEQ 2000a)	No. of samples above DWPC (MDEQ 2000a)	No. of samples above GSIPC (MDEQ 2000a)	Reference
	1/26/91	10,100	8,720[1]	2 / 2	0	2	0	Weston 1991
	10/27/99	22,300	20,800	6 / 6	0	6	0	MDEQ 2000b
isopropylbenzene	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.23	0.136	1 / 5	0	0	0	MDEQ 2000b
lead	9/14/90	*76.5*	*52.4*	6 / 6	0	0	0	Weston 1991
	1/26/91	*8.8*	*8.25*[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	*57.5*	*40.9*	6 / 6	0	0	0	MDEQ 2000b
magnesium	9/14/90	28,200	21,800	6 / 6	0	6	0	Weston 1991
	1/26/91	19,600	16,500[1]	2 / 2	0	2	0	Weston 1991
	10/27/99	27,600	21,000	6 / 6	0	6	0	MDEQ 2000b
manganese	9/14/90	**978**	**850**	6 / 6	0	6	0	Weston 1991
	1/26/91	**999**	**601**[1]	2 / 2	0	2	0	Weston 1991
	10/27/99	**897**	**650**	6 / 6	0	6	0	MDEQ 2000b
mercury	9/14/90	0.18	0.0888	1 / 6	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.15	0.131	6 / 6	0	0	0	MDEQ 2000b
2-methylnaphthalene	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.041	0.0243	1 / 5	0	0	0	MDEQ 2000b
4-methylphenol	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	*0.13*	*0.0965*	2 / 5	0	0	0	MDEQ 2000b
naphthalene	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.52	0.316	2 / 5	0	0	0	MDEQ 2000b
nickel	9/14/90	**468**	**256**	6 / 6	0	1	0	Weston 1991

Table 4. (Cont.)

Chemical	Date	Maximum Concentration (ppm)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppm)	No. of detections / No. of samples	No. of samples above DCC for Indsutrial and Commercial Land Use (MDEQ 2000a)	No. of samples above DWPC (MDEQ 2000a)	No. of samples above GSIPC (MDEQ 2000a)	Reference
	1/26/91	*10.9*	*9.7*[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	**132**	**90.5**	6 / 6	0	1	0	MDEQ 2000b
4-nitrophenol	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.031	0.0184	1 / 5	0	0	0	MDEQ 2000b
PCBs (total)	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	**0.074**	**0.0644**	3 / 5	0	0	0	MDEQ 2000b
phenanthrene	9/14/90	0.35	0.288	3 / 4	0	0	0	Weston 1991
	1/26/91	0.28	0.24[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	0.29	0.215	4 / 5	0	0	0	MDEQ 2000b
selenium	9/14/90	0.88	0.524	1 / 6	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.84	0.414	1 / 6	0	0	0	MDEQ 2000b
silver	9/14/90	ND	ND	0 / 6	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.64	0.472	5 / 6	0	0	0	MDEQ 2000b
sodium	9/14/90	403	328	6 / 6	0	0	0	Weston 1991
	1/26/91	155	132[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	276	223	6 / 6	0	0	0	MDEQ 2000b
thallium	9/14/90	0.53	0.511	3 / 6	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	ND	ND	0 / 6	ND	ND	ND	MDEQ 2000b
toluene	9/14/90	0.96	0.76	2 / 4	0	0	0	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.086	0.0509	1 / 5	0	0	0	MDEQ 2000b
vanadium	9/14/90	**26.5**	**25.1**	3 / 6	0	0	0	Weston 1991

Table 4. (Cont.)

Chemical	Date	Maximum Concentration (ppm)	95% Upper Confidence Limit of Mean Concentration (UCL) (ppm)	No. of detections / No. of samples	No. of samples above DCC for Indsutrial and Commercial Land Use (MDEQ 2000a)	No. of samples above DWPC (MDEQ 2000a)	No. of samples above GSIPC (MDEQ 2000a)	Reference
	1/26/91	**10.8**	**8.9**[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	**31**	**25.8**	6 / 6	0	0	0	MDEQ 2000b
xylenes (total)	9/14/90	ND	ND	0 / 4	ND	ND	ND	Weston 1991
	1/26/91	ND	ND	0 / 2	ND	ND	ND	Weston 1991
	10/27/99	0.21	0.124	1 / 5	0	0	0	MDEQ 2000b
zinc	9/14/90	183	131	6 / 6	0	0	0	Weston 1991
	1/26/91	23.6	20.1[1]	2 / 2	0	0	0	Weston 1991
	10/27/99	154	126	6 / 6	0	0	0	MDEQ 2000b

Bold concentrations exceed ACVs (ATSDR 2000f).

Shaded, double-lined chemicals have no ACVs in this medium (ATSDR 2000f).

Italicized concentrations did not exceed ACVs for non-cancer health effects but the chemicals are considered carcinogens and there are no CREGs available in this medium (ATSDR 2000f).

Chemicals of concern which are not listed were never detected in this medium.

ND — Not Detected

Table 5. Concentrations of chemicals of concern found in groundwater samples collected from temporary monitoring wells on the Sandfill Landfill #2 property during the Brownfield Redevelopment Assessment of the property (1999).

Chemical	Maximum Concentration (ppb)	No. of detections / No. of samples	No. of samples above MDEQ Groundwater Contact Criteria (MDEQ 2000a)	No. of samples above U.S. EPA Drinking Water Standards or DWC (MDEQ 2000a, U.S. EPA 1996)	No. of samples above Groundwater-Water Contact Criteria (MDEQ 2000b)
aldrin	**0.023**	1 / 9	0	0	0
aluminum	1,030	9 / 9	0	9[1]	0
antimony	**11.5**	4 / 9	0	2	0
arsenic	**80.4**	7 / 9	0	1	0
barium	**23,800**	9 / 9	0	1	2
benzene	**32**	6 / 9	0	5	0
beryllium	**0.1**	1 / 9	0	0	0
alpha-BHC	**15**	2 / 9	0	1	0
beta-BHC	**1**	3 / 9	0	1	0
gamma-BHC (Lindane)	**24**	4 / 9	0	1	2
delta-BHC	**10**	3 / 9	0	1	0
bis(2-ethylhexyl)phthalate	**3**	2 / 9	0	0	0
cadmium	*1.1*	1 / 9	0	0	0
carbazole	2	1 / 9	0	0	0
chloroethane	5	3 / 9	0	0	0
chromium	**59**	9 / 9	0	0	2
cobalt	20.2	9 / 9	0	0	0
copper	27.6	6 / 9	0	0	0
cyanide	10.4	9 / 9	0	0	0
cyclohexane	4	1 / 9	0	0	0
ethylbenzene	260	2 / 9	0	1	1
iron	46,300	9 / 9	0	9[1]	0
isopropylbenzene	13	3 / 9	0	0	0
lead	**93.1**	4 / 9	0	3	1
magnesium	388,000	9 / 9	0	0	0
manganese	**872**	9 / 9	0	9[1]	0
mercury	0.17	7 / 9	0	0	7
methylcyclohexane	2	1 / 9	0	0	0
2-methylnaphthalene	6	2 / 9	0	0	0
2-methylphenol	*6*	1 / 9	0	0	0
4-methylphenol	*21*	1 / 9	0	0	0
naphthalene	**95**	3 / 9	0	0	1
nickel	*90.2*	9 / 9	0	0	0
PCBs (total)	**0.48**	1 / 9	0	0	1
phenanthrene	2	1 / 9	0	0	0
silver	1.8	1 / 9	0	0	1
sodium	1,140,000	9 / 9	0	7	0
thallium	**2.8**	1 / 9	0	0	0
vanadium	6.3	8 / 9	0	3	0

1. The MDEQ Clean-Up Criteria for this chemical in drinking water is the U.S. EPA Secondary Maximum Contaminant Level, established based on non-health related consideration such as appearance, taste, and odor (MDEQ 2000b, U.S. EPA 1996).

Table 5. (Cont.)

Chemical	Maximum Concentration (ppb)	No. of detections / No. of samples	No. of samples above MDEQ Groundwater Contact Criteria (MDEQ 2000a)	No. of samples above U.S. EPA Drinking Water Standards or DWC (MDEQ 2000a, U.S. EPA 1996)	No. of samples above Groundwater-Water Contact Criteria (MDEQ 2000b)
xylenes (total)	1,800	3 / 9	0	1	3
zinc	136	9 / 9	0	0	0

Reference: MDEQ 2000b

Bold concentrations exceed ACVs (ATSDR 2000f).

Shaded, double-lined chemicals have no ACVs in this medium (ATSDR 2000f).

Italicized concentrations did not exceed ACVs for non-cancer health effects but the chemicals are considered carcinogens and there are no CREGs available in this medium (ATSDR 2000f).

Chemicals of concern which are not listed were never detected in this medium.

Table 6. Concentrations of chemicals of concern in water samples collected from residential wells near the Sandfill Landfill #2 property during the J&L Landfill Remedial Investigation (1990) and after the MDCH private well survey (1997).

Chemical	Date	Maximum Concentration (ppb)		No. of detections / No. of samples	No. of samples above U.S. EPA Drinking Water Standards or the DWC (MDEQ 2000a, U.S. EPA 1996)	Reference
		Up gradient	Down gradient			
aluminum	7/24/90	NR	NR	NR	NR	Weston 1991
	10/23/97	NR	46.5	4 / 12	0	MDEQ 1998
ammonia	7/24/90	NR	NR	NR	NR	Weston 1991
	10/23/97	NR	1,500	8 / 12	0	MDEQ 1998
arsenic	7/24/90	ND	**6.5**	1 / 8	0	Weston 1991
	10/23/97	NR	**7.3**	6 / 12	0	MDEQ 1998
barium	7/24/90	222	652	8 / 8	0	Weston 1991
	10/23/97	NR	NR	NR	0	MDEQ 1998
gamma-BHC (Lindane)	7/20/90	0.03	ND	1 / 8	0	Weston 1991
	10/23/97	NR	NR	NR	0	MDEQ 1998
bis(2-ethylhexyl)phthalate	7/24/90	1	ND	1 / 8	0	Weston 1991
	10/23/97	NR	NR	NR	0	MDEQ 1998
cadmium	7/24/90	*0.11*	ND	1 / 8	0	Weston 1991
	10/23/97	NR	NR	NR	0	MDEQ 1998
chlorodibromomethane	7/24/90	ND	ND	0 / 8	0	Weston 1991
	10/23/97	NR	**1.5**	1 / 12	0	MDEQ 1998
chloroform	7/24/90	ND	ND	0 / 8	0	Weston 1991
	10/23/97	NR	**11.9**	1 / 12	0	MDEQ 1998
copper	7/24/90	32.2	9.4	4 / 8	0	Weston 1991
	10/23/97	NR	ND	0 / 12	0	MDEQ 1998
dichlorobromomethane	7/24/90	ND	ND	0 / 8	0	Weston 1991
	10/23/97	NR	**5.6**	1 / 12	0	MDEQ 1998
iron	7/24/90	3,330	3,150	8 / 8	5	Weston 1991
	10/23/97	NR	36,200	9 / 12	7	MDEQ 1998
lead	7/24/90	*10.4*	ND	1 / 8	1	Weston 1991
	10/23/97	NR	ND	0 / 12	0	MDEQ 1998
manganese	7/24/90	236	133	7 / 8	5	Weston 1991
	10/23/97	NR	**1,180**	3 / 12	3	MDEQ 1998
sodium	7/24/90	43,300	473,000	8 / 8	2	Weston 1991
	10/23/97	NR	721,000	8 / 12	4	MDEQ 1998
thallium	7/24/90	**1.1**	ND	1 / 8	0	Weston 1991
	10/23/97	NR	NR	NR	0	MDEQ 1998
vinyl chloride	7/24/90	ND	ND	0 / 8	0	Weston 1991
	10/23/97	NR	**0.8**	1 / 12	0	MDEQ 1998
zinc	7/24/90	99.9	63.2	7 / 8	0	Weston 1991
	10/23/97	NR	220	2 / 12	0	MDEQ 1998

Bold concentrations exceed ACVs (ATSDR 2000f).

Shaded, double-lined chemicals have no ACVs in this medium (ATSDR 2000f).

Italicized concentrations did not exceed ACVs for non-cancer health effects but the chemicals are considered carcinogens and there are no CREGs available in this medium (ATSDR 2000f).

Chemicals of concern which were never detected in this medium are not listed.

Table 6. (Cont.)

ND Not Detected

NR Not Reported or Not Analyzed for.